

Extended distribution and variation in morphological features of *Disparoneura (Chloroneura) quadrimaculata* (Rambur, 1842) (Odonata: Zygoptera; Protoneuridae) in the Mt. Abu ranges of Southern Rajasthan, India

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Abstract

***Disparoneura* (=Chloroneura) *quadrimaculata* (Rambur, 1842), earlier documented to be endemically present in the mountain ranges of the Western Ghats in southwestern states and the Satpura mountain ranges in Central India, has recently been recorded for the first time near the Nakki Lake in Mount Abu (Alt. 1220 m s.l.) range of the Aravalli Hills in south-western Rajasthan, India.**

Keywords: *Disparoneura* (=Chloroneura) *quadrimaculata*, Mt. Abu, Nakki Lake.

Introduction

Before the genus *Chloroneura* Laidlaw, 1917 was subsumed into *Disparoneura* (cf. Davis and Tobin, 1985), it comprised two valid species, i.e., *C. apicalis* Fraser and *C. quadrimaculata* (Rambur), both of which originated from India (cf. Fraser, 1933). Biogeographically, *D. apicalis* is exclusively confined to the lower reaches of the Cauvery River, Coorg (S. India), whereas *D. quadrimaculata* with a more extensive range occurs in Western Ghats, Coorg, Deccan and Central Provinces (Madhya Pradesh). During a planned expedition with Dr. Peter Miller, a highly celebrated odonatologist in reproductive biology from Oxford University, UK, in the sylvatic mountainous environments of the Nakki Lake in Mt. Abu (Alt. 1220 m s.l.), located in southern Rajasthan State, we came across a large number of elegant damselflies which preferred to engage in dance in tandem and basking in Sun on the rocks and vegetation near the Nakki Lake. Due to their striking beauty and rather unusual character of nuptial flight we collected about a dozen specimens, both male and female. On close examination of these specimens it became clear that the species exhibited quite some different traits which need to be brought on

record for reason of understanding its geographical expansion in an area hitherto a terra incognita for the species and the taxonomically important changes in morphological features almost approximating to be a different species. We describe in this brief note, the expansion and variation in morphological characters of *D. quadrimaculata* so as to induce a conservatory scheme for this beautiful creature in the vicinity of a major wetland, the Nakki Lake.

Material and Methodology

A total of 13 *D. quadrimaculata* specimens were sampled around the Nakki Lake, Mt. Abu (alt. 1220m s.l., lat. 24° 6' N, long. 72° 44' E) in the tail of Aravalli mountain ranges in Sirohi District, Rajasthan, India, on September 1st, 1990. These specimens were finally confirmed as *D. quadrimaculata* by Professor Peter Miller by comparing the specimens with an extensive series of *D. quadrimaculata* in the British Museum (Natural History), with the help of Dr. Steve Brooks, Curator Odonata Section.

Distinctively variant characteristics were observed in (i) male genitalia, (ii) relatively higher number of postnodals in both the fore-

and hind wings, (iii) totally dark antennae save for the basal two segments, and (iv) abdominal segments 7-9 black.

Description of male *Disparoneura quadrimaculata*

Male – Labium pale ; labrum reddish brown: clypeus, frons, occiput, and vertex all dull-red; genae and under surface of head yellowish; labrum with a median black pit almost touching the clypeus; eyes in life bright blood red; antennae 5-segmented, torus and first basal segment reddish, second segment only two-third reddish, darkening apically; rest completely black, antennae angulated at the tip of first basal segment; between the eyes two almost horizontal equatorial black stripes run parallel, the front thinner line arising from the inner edge of the eyes move inwardly and encircles the base of the antennae pronouncedly only on the front half circle, then centering gradually to be thickened mealy; another more thicker line runs rather irregularly between the broadly darkened-base of the eyes, touching the posterior ocelli and extending like an arm from the outer side to faintly meet the bases of the two antennae; the broader strips in fact dive backwards to encircle a large dull red area in the region of vertex, two dark circular spots between the two dark strips near the base of each eye (Fig. 1).

Prothorax dull brick-red mapped with black along sutures and sulci, rear lobes convex; thorax brightly red on the dorsum, turning yellowish on the undersides, and marked with black varyingly (considering the paratypes), stripes on the sutures are always broader along the upper edge; wings hyaline basally and apically, barred with a broad blackish-brown fascia which in the forewings extends from the first postnodal to the ninth postnodal, while in the hindwings begins from the fourth postnodal to the thirteenth postnodal; forewings with 16-18 postnodals and hindwings with 14-15 postnodals; Cu_{ii} 10 to 11 cells long in forewing, 10 to 12 in the hind; pterostigma diamond-shaped with distal nervure more convex, yellowish-brown, strongly bordered, braced and covering only one cell. Legs colored and armored as follows: foreleg femur black on the underside, narrowly and proximally, but gradually broadening distally to cover almost

whole of the surface, tibia black only along the base of spiky armature, rest yellowish brown, tarsi totally black, basal tarsus with three short, stout, sharp pointed black spikes curved forwardly and downwardly, middle tarsus with 3-4 similar spikes, apical tarsus with 4-5 spikes; middle leg femur with speckling on the underside extending from base to about halfway only then diffusing into black broadening towards the apex, tibia and tarsi colored as of foreleg, basal tarsus with 3 spikes, middle with 5 and terminal with 4-5 spikes; hind leg femur with the speckling on the underside extending two-third the end, tibia and tarsus similar to the other two legs, basal tarsus with three spikes, middle tarsus with 5-6 and terminal with 4-5 spikes; in all tarsi the last spike is the largest.

Abdomen brick-red, marked with white, brown and black as follows: broad black spot on the dorsum arising from the base but narrowing towards the distal part; segment 2 with a large ring of black on the dorsum touching the base but falling just short of the apex; a narrow longitudinal stripe of black falling similarly short of the apical black rim; segments 3-6 each with a pair of small dorsolateral whitish spots at base, narrowly bordered with black, a narrow ventro-lateral stripe on each side ending short of base and apex, apical one-fifth or so blackish-brown in annules, apical annule of segment 6 jet black; segments 7-9 black, with only base of segment 7 with a highly indistinct and obscured whitish spot; segment 10 reddish dorsally, blackish-brown side wise and below. Anal appendages with superiors reddish-brown dorsally, characteristically notched and inwardly and downwardly bend to form a pointed process in black; inferiors black, obtuse as seen latterly, curled a little inwardly to form acute apices, extending beyond the apices of the superiors as seen from both dorsal and lateral sides (Fig. 2).

Comparing with other species

Disparoneura quadrimaculata (Ramb.) and *D. apicalis* (Fraser) are the only other two species described under the original genus *Chloroneura* (cf. FRASER, 1933). However, the collected specimens were most closely related to *D. quadrimaculata* (Ramb.). Interestingly, on an average our specimens of *D. quadrimaculata*

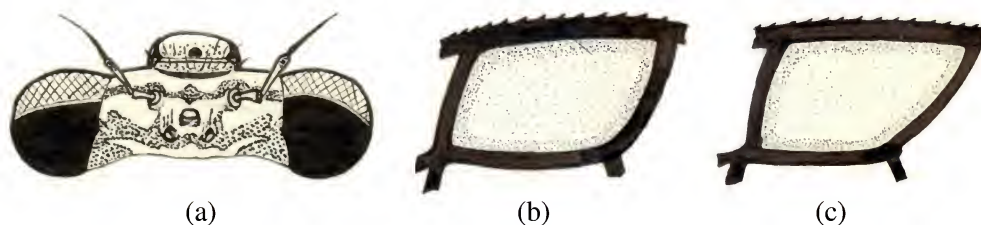


Figure 1. *Disparoneura quadrimaculata*: (a) Head - structure of head showing black stripes on the dorsum; (b) Forewing - pterostigma, and (c) Hindwing - pterostigma.

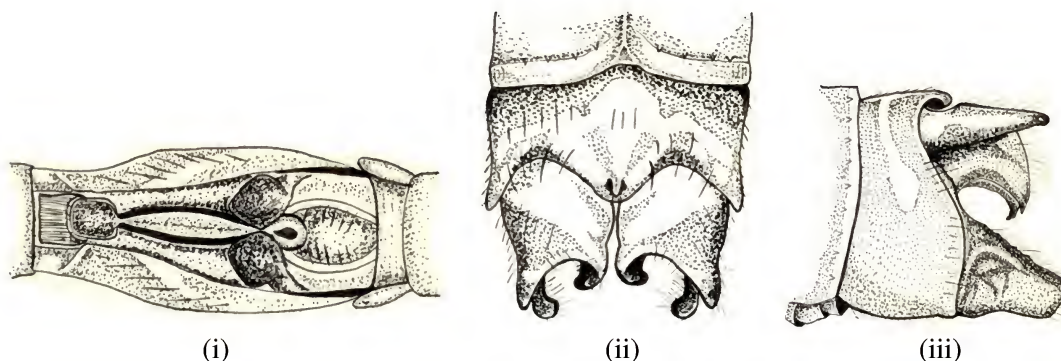


Figure 2. *Disparoneura quadrimaculata*: (i) Secondary copulatory apparatus seen from the ventral side, (ii) Dorsal view of appendages, and (iii) Lateral view of appendages.

Measurements (mm) - total length including cerci 49, abdomen 31, hindwing 21.5.

were slightly smaller in size of body and the wings than those of Fraser's, in forewing and hind wing. In the collected material hind wing is more acutely diamond shaped with the costal nervure markedly longer than its counterpart, the forewing, where the distal nervure is distinctly curved and the costal nervure is only a bit greater in length than its counterpart, but visibly shorter than in the hind wing.

Bioecology

Disparoneura quadrimaculata specimens were always collected near the fast – flowing streams while resting on rocks or vegetation or, as seen some rare cases, on the protruding objects (mostly plant twigs) from the Nakki lake. All specimens were collected on a cloudy day with intermittent rain. (Day

temperature $24^{\circ}\text{C} \pm 2$, and humidity $70\% \pm 10$). Males were seen aplenty, as compared to their counterparts. While roosting on a rock they perched close to the surface with the wings held together backwards and partly covering a portion of the abdomen. But when perching on a vertical twig of a plant the wings though held together backwards a projected clearly above the abdomen. Some pairs were seen in tandem as well. The flying males could be more often spotted by the circular ring formed by the darkened middle parts of the wings.

Although some other odonate species, like *Ischnura aurora* (Brauer), *Orthetrum taeniolatum* (Schneider), *O. pruinatum* (Schneider), *O. neglectum* (Rambur), *O. triangulare* (Selys), *Trithemis festiva* (Rambur) and *Brachythemis contaminata* (Fabricius) were collected from the

nearby areas, within about 2 km from the Nakki lake, but none really seemed to share habitat with *D. quadrimaculata*.

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